

New Rice Naturally Fends Off Weeds

Rice is a staple food for more than half the world's population, with Africa and Asia leading consumption of this nutritious, energy-rich grain. No matter where it's grown, though, rice faces stiff competition from weeds, which can outcompete the crop for sunlight and nutrients.

But not all rice is so easily bullied. Certain indica rice types from Asia, in fact, produce root secretions called "allelochemicals" that, along with other competitive traits, naturally keep weeds at bay. Despite their prospects for reducing herbicide use, weed-suppressive varieties haven't caught on with U.S. growers, largely because of their poor grain quality.

Now, a Stuttgart, Arkansas, team of Agricultural Research Service and University of Arkansas Division of Agriculture (UADA) researchers has worked to tackle the problem by crossing the indica rices with southern U.S. long-grain cultivars. In 2013, in the journal *Plant and Soil*, the team reported its most recent success, STG06L-35-061, a newly developed rice line that combines the best of both worlds. This line has the agronomic traits sought by the U.S. rice industry as well as weed suppression (allelopathy).

According to David Gealy, a plant physiologist at ARS's Dale Bumpers National Rice Research Center in Stuttgart, the new line is the top pick of some 50 total rice lines that were selectively developed for such traits as high grain yield and quality, early maturity, stem strength, pest and disease resistance, and allelopathy to barnyardgrass and other

weeds. Gealy conducted the evaluations as part of a cooperative rice breeding-and-selection program together with UADA rice breeder Karen Moldenhauer and ARS plant geneticist Melissa Jia.

STG06L-35-061 owes its winning combination of agronomic and allelopathic traits to the commercial cultivars Katy and Drew—both tropical japonica rice types—and PI 312777, an indica line. The

with several indica lines, were also tested for comparison.

In preliminary yield trials, conducted in 2008 and 2009, weed-suppression ratings for the new cultivar were 41 percent higher than Katy, 68 percent higher than Lemont, and about equal to PI 312777. In weed-free plots, the new rice averaged about 5,000 pounds of grain per acre versus 5,400 for Drew; 4,000 for Katy; and 4,300 for Lemont.

Although tall growing, the new cultivar's sturdy, upright stems kept it from lodging (falling over). Its kernels also scored well on industry tests for cooking and milling properties, with quality similar to Francis and other long-grain rices that were evaluated. Marker-based analysis of the new rice also revealed its inheritance of genes for resistance to rice blast, a devastating fungal disease of rice worldwide.

"These traits should enhance its inherent competitiveness against weeds and its suitability for use in organic or other low-input systems," the team notes in the *Plant and Soil* article.—
By [Jan Suszkiw, ARS](#).

This research is part of Plant Genetic Resources, Genomics, and Genetic Improvement, an ARS national program (#301) described at www.nps.ars.usda.gov.

David Gealy and Melissa Jia are with the USDA-ARS [Dale Bumpers National Rice Research Center](#), 2890 Highway 130 East, Stuttgart, AR 72160; (870) 672-9300, ext. 226 [Gealy], (870) 672-9300, ext. 278 [Jia], david.gealy@ars.usda.gov, melissa.jia@ars.usda.gov.*

DAVID GEALEY (D3090-1)



STG06L-35-061 is a new rice line that combines desirable traits like high grain quality with a natural ability to suppress costly weeds like barnyardgrass.

team's trials included multiyear tests of the new cultivar's yield, height, and flowering time in both weed-infested and weed-free plots, with barnyardgrass as the dominant species. Several commercial cultivars, including Katy, Drew, and Lemont, along